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ABSTRACT

This paper describes an experiment in which 30 students, classified according to high and low analytical performance, were given a reading and text production test to determine their sensibility to the structure of an Icelandic saga. This material was used because of its extreme simplicity on the textual surface level, a property suited for studying structure as something beyond the surface. The hypothesis tested is whether the structure mediated though the produced texts pertains to a descriptive dimension, implying analytic sensibility or to a reflective dimension, indicating synthetic sensibility. Hence, the aim of the experiment was to demonstrate the extent to which a certain learning strategy is governing the pick-up and production of a particular structure. Since synthesis is connected with structure, it implies that synthesis can only be studied through the structure of text production. In advancing the bio-kinetic hypothesis that the complexity and nonlinear dynamics of a produced discourse can be approached on the basis of the Agent-action-Objective (AaO) paradigm, it is shown that the derived [AaO] units rotate and AaO-governed rotations are including A- and O- functions that can be imaged in real time. On the basis of two discourses concerning the Icelandic saga, it is demonstrated that a system of [AaO] units has the capacity to keep track of rotations and to assemble textual elements that fit into the structure of a particular text. Discourse (A) has been shown to produce a state space in which the terminus, associated with the global state attractor, communicates an inevitable course of events, while the other (B) communicates boldness as final outcome. Thus, the results of the experiment make evident that significant differences in emergent consciousness are crucially dependent on structural sensibility and the developed learning strategies. (Contains 10 figures and 15 references.) (SLD)

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Abstract

The article presents an experiment in which students, classified according to high and low analytical performance, were given a reading and text production test to determine their sensibility to the structure of an Icelandic saga. This material was used because of its extreme simplicity on the textual surface level, a property suited for studying structure as something beyond the surface. The hypothesis tested is whether the structure mediated through the produced texts pertains to a descriptive dimension, implying analytic sensibility or to a reflective dimension, indicating synthetic sensibility. Hence, the aim with the experiment has been to demonstrate the extent to which a certain learning strategy is governing the pick-up and production of a particular structure. Since synthesis is connected with structure, it implies that synthesis can only be studied through the structure of text production. In advancing the bio-kinetic hypothesis that the complexity and non-linear dynamics of a produced discourse can be approached on the basis of the Agent-action-Objective (AaO) paradigm, it is shown that the derived [AaO] units rotate and AaO-governed rotations are including A- and O-functions that can be imaged in real time. On the basis of two discourses concerning the Icelandic saga, it is demonstrated that a system of [AaO] units has the capacity to keep track of rotations and to assemble textual elements that fit into the structure of a particular text. Discourse (A) has been shown to produce a state space in which the terminus, associated with the global state attractor, communicates an inevitable course of events, while the other (B) communicates boldness as final outcome. Thus, the results of the experiment make evident that significant differences in emergent consciousness are crucially dependent on structural sensibility and the developed learning strategies.

What makes the present approach to the relationship between consciousness and competence possible is its metaphysical determination. A most significant advance in the exploration of conceived metaphysical circumstances becomes evident, if it is possible to manifest the AaO units for its formation. This implies that the functional aspect of the coordinated emergence of consciousness and competence can be identified and tested according to the following hypothesis:

> *Hypothesis 1.* A fluid form of indexing the metaphysical properties of rotational string dynamics provides for an exact characterisation of the emergence of consciousness in the development of competence.

According to hypothesis 1 the topic to be treated concerns the coupling between "intention" and "orientation", which is no longer the objective of the physical conditions of experimentation. Instead, it is the metaphysical determination of information, carried by the terminal states, that comes into focus. The idea behind the experimental arrangement of Figure 1 is that non-linear dynamical states are organising themselves in unique ways.

Figure 1.

Establishment of Metaphysical Quality

		O	
	-+a	–	+
A	–	Metaphysical Property	O-function
	+	A-function	Symmetry

A = Intention
O = Orientation

Further, besides enabling an invariant formulation of the involved A- and O-function, the instrumental aspect of any language expression is transcending various contextual constraints and thereby establishing the metaphysical properties of the boundary conditions. Thus each control level is defined by a dynamic system of self-organising A's and O's, which is producing these boundary conditions as levels of constraints, or control constraints. The observer's ability of picking up informational invariants becomes especially explicit in his ability to abstract and depict perceived viewpoints and changes in perspective through their localisation in deformed textual spaces. Experimentally, this ability is demonstrated through in-depth rotations. However, to discover the intentional root of the relationship necessarily means that functional distances must be made evident in the form of manifested symmetries. Therefore, the second hypothesis behind the present approach is the following:

> *Hypothesis 2.* The functional distances between attractors in the state spaces of the AaO-system give expression to rotational dynamics, which as a consequence is manifested in symmetry between consciousness and competence.

Hence, the basic focus will be on the A- and O-function of the AaO-system. The circular coupling of textual agents (α) of the A-function with textual objectives (β) of the O-function is the characteristic property, which allows the treatment of wholeness, and thus order, in the establishment of the explicit and implicit properties of consciousness. Thus, the result of the working of the A- and the O-function will become manifest only to the degree that the attractor spaces of their pronunciation can be reconstructed. Hence the investigation of the space-hypothesis will be based on a third hypothesis:

> *Hypothesis 3*. Explicit and implicit properties of emergent symmetries can be identified with the concept of "functional quality".

Since it has been possible to show that text building behaviour is generating the morphology of text and this morphology is the product of textual evolution, it must be concluded that consciousness necessarily is the result of text production. But contextual constraints of a textual surface always imply the AaO-mechanism that can transcend these constraints and pick up its system properties. It follows that consciousness can evolve only in the presence of the AaO-mechanism.

Structural Sensibility as Indicator of a Learning Strategy

The fundamental hypothesis for presenting this study is that persons in developing a learning strategy rely on their ability to coordinate the intentional and the orientational properties of an environment, such as a text. These properties will be picked up by an internal "synthesiser" and transformed into mental coordinates, forming spaces, which can be detected and represented only through language production. The formation of such a space reflects the degree to which the person is sensible to a certain structure. This sensibility may be an indicator of whether the structures picked up are of a descriptive or of a reflective kind. Reflection would then be a mark of synthesis.

A precondition for the experiment to be set up is that it can be run in a natural learning environment. Now, as everybody knows, it is difficult to define learning of a particular subject. Since previous experiences play an important but undefined role, the goal of the education should be to learn to attend and adjust. This implies that the student contributes to the learning situation with his own specific experience. What the schools provide is the teaching methods and the methods for measurement and testing of knowledge acquisition. This is far more evident today when analytic-descriptive strategies are being played down through school-projects with holistic programs being designed without any knowledge of how holism can be measured and tested. Among other things, there is great confusion concerning the concepts of analysis and synthesis. So, independent of the ambition of the projects, the student will be tested with analytical methods.

Synthesis is connected with the concept of structure. And structure is something that must develop evolutionary, which requires a systematic adaptation in relation to the subject of study. The training of the students in the present experimental set up will consist of tasks with alternating character (description, analysis, conceptual understanding, etc.). All will be carried out with the purpose to guide the student's establishment of sensibility for the structure of a certain material. Sensibility will be tested according to the following hypotheses:

> *Hypothesis 4*. Descriptive and reflective structures can be discerned.

> *Hypothesis 5*. The individual student's sensibility to either strategy can be discovered.

Hence, the ability to apprehend information implies the assumption of learning as a necessary condition for the individual student to overcome certain limits in perception and action. Previous experiences and their effects on subsequent experience as well as one's interaction with particular surroundings is from an ecological point of view a way of attuning the perceptual system to invariant information. This means educating attention and implies an adjustment that depends on past experience, which however should not be mixed up with stored memories (Gibson 1982, p. 172).

Participants

The study was carried out during the last academic year (2001/02). Participated have 30 students from a gymnasium at the city of Lund in Sweden. They were enrolled in the social science studying program at their first year and were between 16-17 years of age.

Materials

After seven month of studying "Swedish" as part of the common Nordic cultural history, the students were asked to read an Icelandic saga, namely the saga of "Gunnlaug Ormstunga". As part of the reading assignment, this saga represents a piece of poetry concerning a person from the Middle Ages of Iceland. Further, this text belongs to the class of short sagas and was selected because it connects to the medieval European culture (probably written at the end of 11th century, Hallberg, 1966). Consequently, essential ingredients were related to medieval ideals of knighthood (chivalry) and romanticism. But the saga builds on the ancient Nordic ideals such as honour and belief in fate.

Since this text belongs to a period of transit, the text contains considerable variability when compared to more genuine Icelandic texts. As a result, the selected saga has been the objective of considerable debate concerning its authenticity, that is, to what degree the saga is an orally communicated history of a person and family or the work of an author (Hallberg, 1964, 1966). However, with regard to a study of a reader's sensibility, this saga is a suitable choice. The saga comprises a variation rich content at the same time as its style of writing reflects the typical Icelandic way of formulating harsh, simple and sharpening expressions. Further, the saga is free from modern milieu descriptions and ways of thinking. Thus, "unbiased" of contemporary fashions the saga represents a pure test material, which should facilitate description and interpretation of the expected results. Finally, the saga appears free from any particular temper (Hallberg, 1964, p. 104), a feature, which further underlines its pureness. Of particular theoretical interest, therefore, is its reader's ability to pick up its structure and to penetrate the question of what kind of structure the reader communicates after comprehension. The version, which has been used in the present experiment, was reproduced in an edition for use in schools, e.g. One-hour book (ca 30 pages of reading). With the purpose to provide a more detailed analysis of the results a presentation of the saga follows below.

> *Gunnlaugs saga "Ormstungu"*: As always, the main characters are of high rank and descendants of Norwegian great men. Emigrating to Iceland in the 9th century was an act of protest against Harald Hårfagre's governmental practices. The male characters are all described as persons who have received noble education, e.g. concerning the way of carrying and handling weapons as well as the art of producing pieces of poetry. Both branches are conceived as useful and are being applied when the Icelanders set off for travel, which is an essential part of their education. In this respect, it is a link to other medieval practices in educating European Nobles. Another main ingredient in the saga is the Icelandic way of administrating justice. For example, of exceptional

import is the weight given to made promises. The solution of ethical conflicts was usually achieved through single combat. But in case of injustice, the family could demand blood vengeance but give up if the counter-part is the stronger one. Likewise, the belief in fate is a strong feature of the Icelandic sagas. Everything must progress as prescribed by fate. In the present saga we already in the beginning learn what fate has been staking out for the main characters.

Torstein Egilson, son of Skallagrim, dreamed that he owned a swan, which was courted by two eagles. But in the dream everything seems to be going wrong in their fight whereupon the swan in grieve left the place together with a falcon. Then the dream was interpreted and later on it turned out that everything indicated appeared to be realised. The swan was Torstein's fair daughter Helga, who at birth should have been exposed to the woods. Through this measure, Torstein attempted to defy the prediction of the dream. However, without his knowledge, she was brought up by relatives and after some years returned back home. As the Icelander he is, he accepts that he could not change the course of fate. Gunnlaug, who later on is visiting Torstein, is courting Helga and is getting her as "promised woman" for three years. Gunnlaug is skilful in the art of making pieces of poetry and also in using the sword which renders him the epithet "Ormstunga". At first he shall set off for his travel abroad but upon return both shall become married. Meanwhile, Gunnlaug is abroad Hravn is courting Helga. Since Gunnlaug is not keeping his promise to return within three years, Helga becomes married with Hravn. When Gunnlaug at last returns home to Iceland, he and Hravn are fighting out several battles, precisely in agreement with the eagle birds of the dream. Finally both are killing each other. Gunnlaug's father demands blood-revenge on the Hravn family, but no revenge is demanded in return. Helga becomes married to a third man, but cannot forget Gunnlaug and when she becomes severely ill, she is sending for a coat, which she received as a gift from him. In sight of the symbol of their promise to each other she is dying in the arms of her husband. The grieved swan experienced never in its life any happiness.

Design and Procedure

The design of the experiment incorporates a number of integrated modules, which were designed with a particular purpose in mind. Hence, the strategy behind the experiment imposes boundaries on the administration, which covers a time span of about seven months (September 2001 to March 2002). The modules were constructed in such a way that alternating activities like reading, writing and presentation assignments guided the student's path in his establishment of some kind of synthesis. It follows that the interest of the study lies in the boundary conditions that is in the layout of a strategy, not in the study of a single module or move on the path. The steps in the sequencing of the modules and their contents have been as follows:

(1) Free choice of a novel. Here the assignment required the student to extract those lines of thought that can be used as basis for the production of a personal portrait, according to provided criteria.

(2) Observation of either fictional or real milieus and the description of one real milieu, free of choice but in agreement with given criteria.

(3) Search for subject-specific information as well as an oral presentation of a free-choice subject, however in agreement with given criteria.

(4) Reading of a novel from another culture together with its conceptual presentation. Here, analysis and presentation are required in the form of a summary. Further, acquisition of new knowledge has to be used in a new task assignment.

(5) Study of prehistoric times as well as ancient literary history by means of text examples. This study has been followed up with a knowledge test of facts.

(6) Deepening of module 5. Writing of an essay, based on subjects that require either an analysis or synthesis.

(7) Study of medieval literary history, based on a text example. This study was followed up with the assignment of a minor task, which had to be executed during a lesson at school. Final reading: saga of Gunnlaug Ormstunga.

In fact, all modules and attached assignments refer to a sequence of boundary conditions above the actual experimental task. From a systems dynamical point of view, these control constraints are expected to lead to an indication of the student's attunement to the production of a discourse as expression of adaptive text building behaviour. For classification and selection of the students' the assignments of module (1) and (4) together with the test of module (5) have been decisive. Further arguments and explanations are given in connection with the description of the following procedure:

Description of Task (1):

A number of criteria have been made explicit and precise in dialogue with the class. The criteria were designed for a descriptive, an analytic and a synthetic (reflective) level. Every level had its own writing task assignment and had to be passed before the next higher level was approached. The criteria were distributed in agreement with the actual level of assignment. Disposition of the single parts into a comprehensive whole made up the stage for the final summary of about 400 words. All essential information had to be preserved at every level. Associated with this task was the extraction and interpretation of relevant information from the selected literature. The summary was evaluated and used to decide upon the grading of the students capacity to select and abstract from their work. Here, the selection of an appropriate novel and the extraction of information as well as the interpretation criteria have been defined as the proper analytical task. In contrast, writing an essay is the productive task, which had to be performed outside school. Except reading, the time span was about four weeks.

Description of Task (4):

At this stage, it became important to get an understanding of the degree to which the students had been sensible to the content of the task. For that purpose, the student had to read novels from other cultures and geographical regions. They made their selection from a list of publications contained in the library of the school. A few lessons followed after reading. In these lessons, the students did split up themselves into groups according to the culture of their reading choice. The task assignment required them to prepare the order in which they would like to present orally their book to the class. This order had to be set up on the basis of cultural, societal, religious and other features of significance, which they had agreed upon as criteria for an "other culture". In running a schedule over 30 presentations of novels in the formed groups, the students were asked to contribute to a joined conceptual analysis of typical features of the studied literature. Discussion in the groups and accounting were thereafter condensed into a number of keywords. After this process had been finished, each and every

student ended up with his own material, consisting of concepts, common for all cultures as well as concepts that were unique for a particular culture.

After this preparation, the students were instructed that an examination was pending. A writing task was anticipated through which the students should be able to show their degree of subject comprehension. No further preparations were accepted, but everything they had produced during the previous stage could serve as an aid in the exam. The goal was to secure the possibility to attest a deeper understanding of the subject. In writing a letter to the school librarian, the task was to give suggestions and justifications for a proper collection and exhibition of literature from other cultures. Hence, the students were asked to produce a synthesis within a functionally meaningful context. The total time span was about six weeks and included reading.

The expected optimal solution showed that the students had achieved an overview, substantiated through the conceptual work and the summary exercise, which preceded the exam. At this stage, it became apparent that a sizeable number of students with good results on the analytical test missed the depth in the present task. Instead of characterising their synthesis of the subject with a few sentence constructions, they answered with listings and exemplifications (e.g. description and analysis) or with general advices, which showed that they had made some inferences (also analytic). Some really unsuccessful letters had only focussed on the local layout of the exhibition (texture), but without any literary connection. Hence sensibility toward exterior features such as local frame factors and organisation determined their attention. Thermodynamically conceived, it can be concluded that the link between the syntax of the exhibition and the layout of its texture is missing.

Description of Task (5):

As a background, literary history and some important text excerpts provided the platform for the study of prehistoric and ancient literature as well as of the evolution of literary genre. The disposition of this section has been of the classical type with guided questions to the textbooks and excerpts, homework, conversation and discussion during lesson hours. The examination of this section was carried out with test items of the yes/no-type. Further, the sequencing was smooth and with every occasion the homework was of the same proportion. Before testing, all relevant subject matter was repeated and summarised into a schedule of author, work, genre, style and main line of thought or theme. In constructing the test, only facts provided during the preparations were included, but without any grading with respect to item difficulty. Thus judgement of the students' success has been based on the achieved points. This exam was administered at school time and carried out in the writing-room of the school. For the entire module, the time span was about four weeks and included the testing.

For the present design of the procedure, this test was selected as a complement to task (1). Since the aim was to find a proper division of the students, their levels of analysis and synthesis had to be preserved. Thus, if they achieved high points at the exam of the cram-type and were equally high in sensitivity towards task (1), the results were taken as an indication of a strong analytical learning strategy.

Description of task (7) – Embedded testing:

The study of medieval literature connected immediately to the module of ancient literature. Basically, the aim with this procedural connection was to achieve an embedding of the crucial test situation into common and naturally occurring instructions. In agreement with the former sections of study, minor homework assignments were thoroughly worked through during the lesson that followed each assignment. However, instead of a preparation of another

test at the end of this section, the students were instructed to produce a number of minor works to be handed in after they had orally manifested their grasp of the homework. Five different occasions were set up at which the students had to reflect and respond to written questions of a deepening kind. These questions have not been prepared besides what had been managed during the lesson. Finally, at the last occasion the students were asked to read the saga of "Gunnlaug Ormstunga". This reading had been prepared with 10 questions about content, milieu, and character description, historical facts, style, and form of narrative. After this performance, which required about 40 minutes, followed once more a minor written question, which the students had to think about. The estimated time for this task was 20 minutes and the written response had to be handed in at the end of the actual lesson. The time span for the entire section was about four weeks, which included reading the saga. Now, the crucial statement was formulated as follows:

> *Statement*: Write the main idea of the saga in the form of a title.
> Explain what you mean.

Single Subject Design

By controlling the results of the tasks (1) and (4) it turned out that a few students demonstrated sensibility towards both analytic and synthesis based assignments. Likewise, another few students showed no particular sensibility. Consequently, the 30 students were classified according to the fourfold table of Figure 2.

Figure 2.

Structural Sensibility: Proportion of Students

		Synthesis: High	Synthesis: Low
Analysis	High	0.10	0.50
	Low	0.16	0.24

The upper left cell contains the number of students scoring high on both analysis and synthesis, and the lower right shows those students scoring low on both analysis and synthesis. Figure 2 demonstrates that 60% of the students can be characterised as high in analytical capacity, while 40 % manifest low results. Simultaneously it can be pointed out that 26% demonstrate high capacity in synthesis, meanwhile 74% score low on this dimension. One more step had to be taken in order to determine the individual participant's structural sensibility. Therefore, the students in each subgroup were rank-ordered. The students who had the highest rank (1 = most typical) in the upper left and lower right cell were selected for further treatment. So far it is worth noting that the procedure seems to have been successful in discerning analytic as well as synthetic properties in that two persons are found, who indicate very different sensibility. It is therefore important to find out whether this result is only indicative or whether it is evident.

Results

Based on the previously formulated assumptions is it expected that human mental space is formed by both descriptive and reflective structures and that its manifestation is reflecting different degrees of structural sensibility of the students. The written discourse of the selected two students will be designated with (A) for the student from the lower right cell (low on both analysis and synthesis) and with (B) for the student from the upper left cell. As a first measure, the original Swedish text (A) and its literal translation will be reproduced now:

Text (A): Original Swedish Production

Rubrik: Ödets makt
Jag tycker att bokens budskap var: Du kan inte undgå ditt öde. Även om huvudrollsinhavarna Gunnlaug, Helga och Ravn inte kämpade emot sitt öde, så gjorde deras släkter det på ett eller annat sätt. Helgas pappa satte ut henne i skogen. Ravn och Gunnlaugs familjer försökte stoppa deras holmgång. Men allting slutade ändå i deras död. Hela historien visar en sak: Du kan inte undgå ditt öde.

Text (A): Literal English Translation

Title: The Power of Fate
I think that the book's message is: You cannot escape your fate. Even though the holders of the main characters Gunnlaug, Helga, and Ravn did not fight against their fate, the fact is that their families did that in one or the other way. Helga's dad exposed her to the woods. Ravn and Gunnlaug's families tried to stop their struggle. But everything ended yet in their death. The whole story shows one thing: You cannot escape your fate.

It was expected that a student with an analytical approach can only reach a descriptive level. Thus, the student would generate only simple texts. Content-wise it means that (A) is focussing attention on the triangle of Gunnlaug, Helga and Hravn. These characters are exposed to the power of fate since the Gunnlaug saga contains the following tri-angle drama: (1) Torstein's dream (= Helga's fate), (2) Torstein's defying action, (3) Gunnlaug promised to Helga, (4) Gunnlaug delayed abroad, (5) Helga married to Hravn, (6) Gunnlaug and Hravn in combat, (7) Both die – Blood vengeance (= Victory of Fate).

In commenting on the produced text, it should be kept in mind that the English translations can only be conceived of as approximations of the original Swedish sentence constructions. Nevertheless, the question is whether and to what degree there is a deeper dimension embedded in the tri-angle drama to which one can be "attuned". The story of the Icelandic hero of the saga circles around his fate and how he puts with it or defies it. The post-mortem condition, i.e. the sentence over dead man as it goes in the Hávamal, will show how fair his actions are judged. Consequently, Gunnlaug's struggle is seen as the righteous punisher's share. He has accepted what fate had staked out. Torstein, on the other hand, is the one who demonstrates the existence of fate and is activating it. In him there is doubt and obstinacy towards fate before he finally accepts to submit. Hence, there is a certain current in the actions, which may cause reflection.

Text (B), which was expected to be guided by a synthetic approach, would consequently show relative "depth" and reflect a line of thought that cannot be read out by simply following a course of events.

Text (B): Original Swedish Production

Rubrik: Det som sker det sker
Man kan inte undkomma sitt öde. Det är vad boken säger, tycker jag i stort sett. Torstens dröm i början ger ju honom en bild, som Bergfinn målar upp, vilken han inte blir så förtjust i. Även om han inte ger sken åt norrmannen att han tror på honom, så visar ju hans handling att sätta ut barnet, var han verkligen står. Men det går inte som han tänkt, barnet får växa upp och spådomen drömtydningen, blir sann. Alltså spelar det ingen roll vad man gör, ödet finns där och väntar på oss, även om det kanske finns många olika vägar dit. För historiens personer hade ju livet tett sig en aning annorlunda åtminstone till att börja med om Helga fått växa upp hela sitt liv hos sina föräldrar. Det är punkter på livets vägbana där vi kommer att stanna.

Text (B): Literal English Translation

Title: That which happens, that happens ("Que sera sera")
One cannot get off one's fate. That is what the book says, I think by and large. Torsten's dream in the beginning gives him, you know, a picture that Bergfinn is painting up, which he is not becoming delighted at. Even though he is not giving up his face at the Norwegian that he believes in him, nevertheless, his action to expose the child, shows, you know, where he really stands. But it goes not as he thinks, the child is allowed to grow up and the prediction, the interpretation of the dream becomes true. On the whole, it doesn't matter what one is doing, the fate is there and is waiting for us, even though there may be many different ways in that direction. For the characters of the story, life would have taken some other road and thus become otherwise, at least to begin with, if Helga had been growing up her entire life with her parents. These are points on the path of life where we come to rest.

Obviously Text (B) shows a level of analysis that includes justifications or explanations of a reflective kind and consequently a concern with Torstein's dream and his feelings towards the prediction. Likewise attention is also paid to the detour action, which, however, cannot change the inevitable course. The text ends with a reflection on the possible outcome, if one would have been able to steer fate.

In conclusion (A) is concerned with the external events, which are immediate and thus do not involve reasoning about them. The unconditional feature is described through the families' attempt to escape that, which cannot be avoided. This is the objective and matter-of-fact based content. It follows that text (A) gives expression to an attunement to surface features and consequently to an indication of an analytic-descriptive level. The other text (B) is concerned with the reflective dimension. This text indicates another sensibility, which moreover on the whole is unconcerned with the battle for honour, but possibly with the inner fight of Torstein. That latter could also be taken as an attunement to the current in the material that encourages one to change the patterns of life.

Now, let us look at the results when Perspective Text Analysis (PTA) has worked in the unfolding of the text spaces. The purpose with PTA is to get at the way in which a descriptive or a reflective structure may be separated and described (B. Bierschenk, 1991, 2001; B. Bierschenk, & I. Bierschenk, 1993; B. Bierschenk, I. Bierschenk, & H. Helmersson, 1996; I. Bierschenk, 1999). Since the assumption has been that a reflective text gives expression to synthesis, it may also be expected that the operations unfolding their spaces will discover corresponding differences. The unfolded spaces of text (A) will be presented in the Figures 3 and 4, while the unfolded spaces of text (B) will be demonstrated in the Figures 5 and 6.

Unfolding the Text Spaces

As a first step in getting hold of the space of the Objective-component, it is important to reproduce the number of β-variables, which hold the viewpoints. Their number is limited through the strictness in composition. To convert the corresponding rotation values to a mesh plot, the SigmaPlot grid (2002, Version 8) has been used. Interpolation has been carried out with the smoothing method that uses the negative exponential, which applies a Gaussian weight function [e^{-u2}] to weight the radians and a quadratic fit. The Y-axis of the mesh represents the intervals in the way they occur during text production. The X-axis shows the number of variables in their relation to a particular interval. Obviously, corresponding unfolding operations entail the concept of time and its expression through successively increasing and decreasing shades in the angular articulation of the viewpoints. In this way it has been possible to visualise the dynamic aspect of a shape in the form of a three-dimensional space. The space determination makes clear the phase dependency (= sliding) in the movement patterns of the viewpoints.

Through the Figures 3 to 6, four spaces come into view. Their shifts in shading manifest shifting accelerations. The theoretical significance of the shading property relates to the determination of the evolving space and the way in which it is restricting pattern movement. Pattern movements in a textual space at different phase transitions are of course influenced by the observations that the text producer has made and communicated. To communicate is a matter of realising "viewpoints" as well as a "perspective". The way in which these two aspects of communication have governed the evolution of a text space will now be studied with reference to Text (A) and (B).

A very high degree of similarity in geometric form of the spaces of Text (A) on one hand and a corresponding degree of similarity of the spaces of Text (B) can be verified by visual inspection. Ostensive contour similarity of the shapes implies exactness in the coordinative movement of the textual elements. The spaces of (A) appear fairly "flat" and extend mainly above the zero line. Only at one interval it shows a steep slope. Two distinctions are easily picked up. A peak appears with the α-variable in the third interval of the unfolded intention space. Since the angular values show only minor variations in all other intervals, it can be concluded that the speed of rotation has developed on the basis of short and swift intervals. This is the result of the text producer's explicitness. However, the variations in the dynamics of the β-variables are pointing towards a processing of some implicit objectives at the beginning of the discourse. But both spaces make evident that the sentence construction is poor. Otherwise the "valleys" would have been more swaying like those of Text (B). The latter is much larger with respect to number of β-variables and the number of produced intervals. At several instances Text (B) shows places of remarkable "depth", which indicate implicitness and thus syntactic variability. Space comparison makes immediately clear that the underlying dynamics relates to markedly different production processes.

Folding the Text Spaces

In summary, the Gunnlaug saga has been selected on the basis of the following properties: (1) it is short, (2) it tells about the Middle Ages of Iceland, (3) it connects to the medieval Europe, (4) it comprises a variation rich content, (5) its style is simple and laconic, (6) it is free from modern associations, but (7) contains some non-typical ingredients. Based on the textual variable of the unfolded spaces, it will now be demonstrated, that it is possible to treat them as context variables and to capture their invariant conditions through naming of the emerging state attractors. Families of state attractors consist of patterns of (+) and (-) articulations that can be made visible.

Figure 3.

Text A1: Analytic = Descriptive Approach to the Saga of Gunnlaug Ormstunga

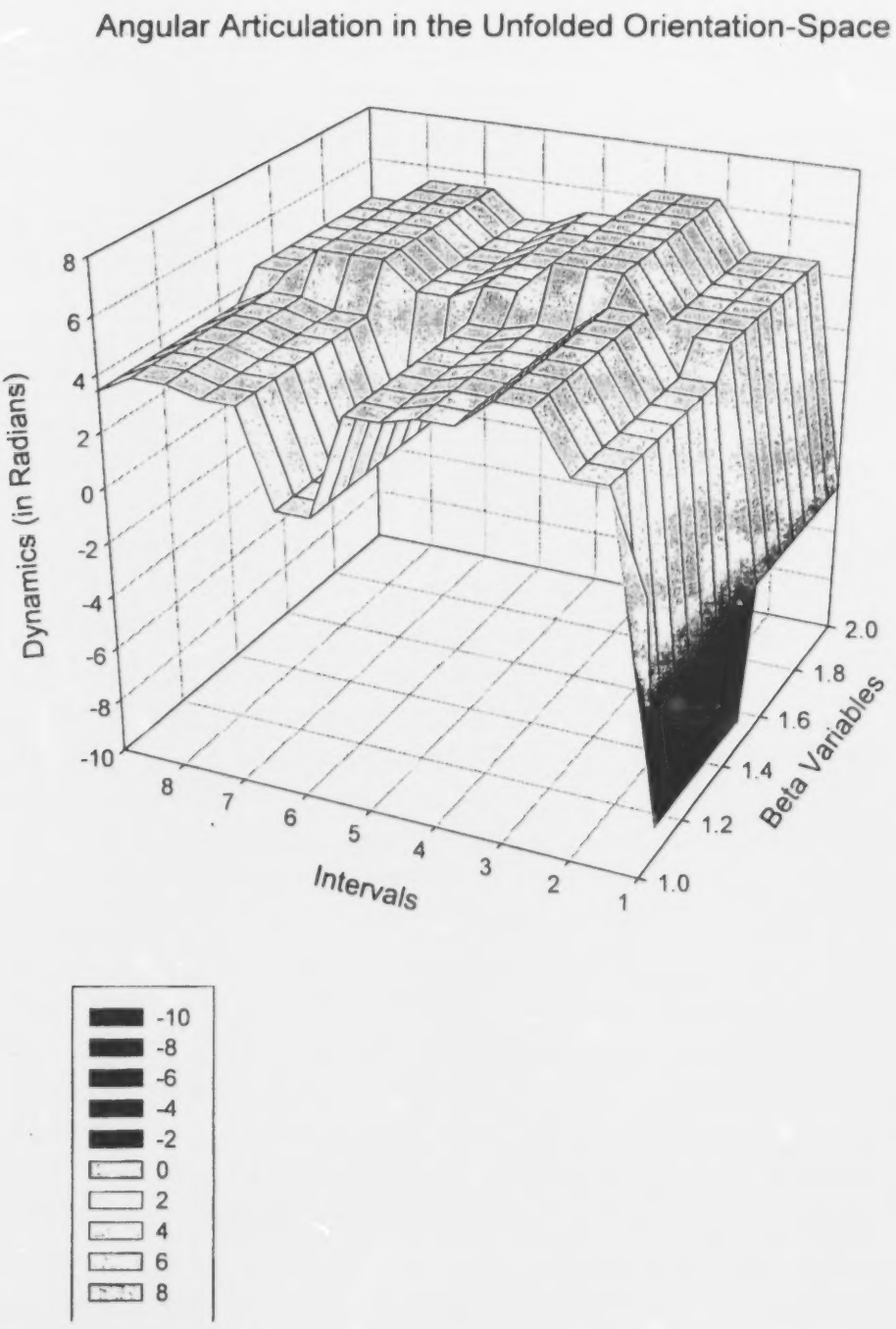


Figure 4.

Text A1: Analytic – Descriptive Approach to the Saga of Gunnlaug Ormstunga

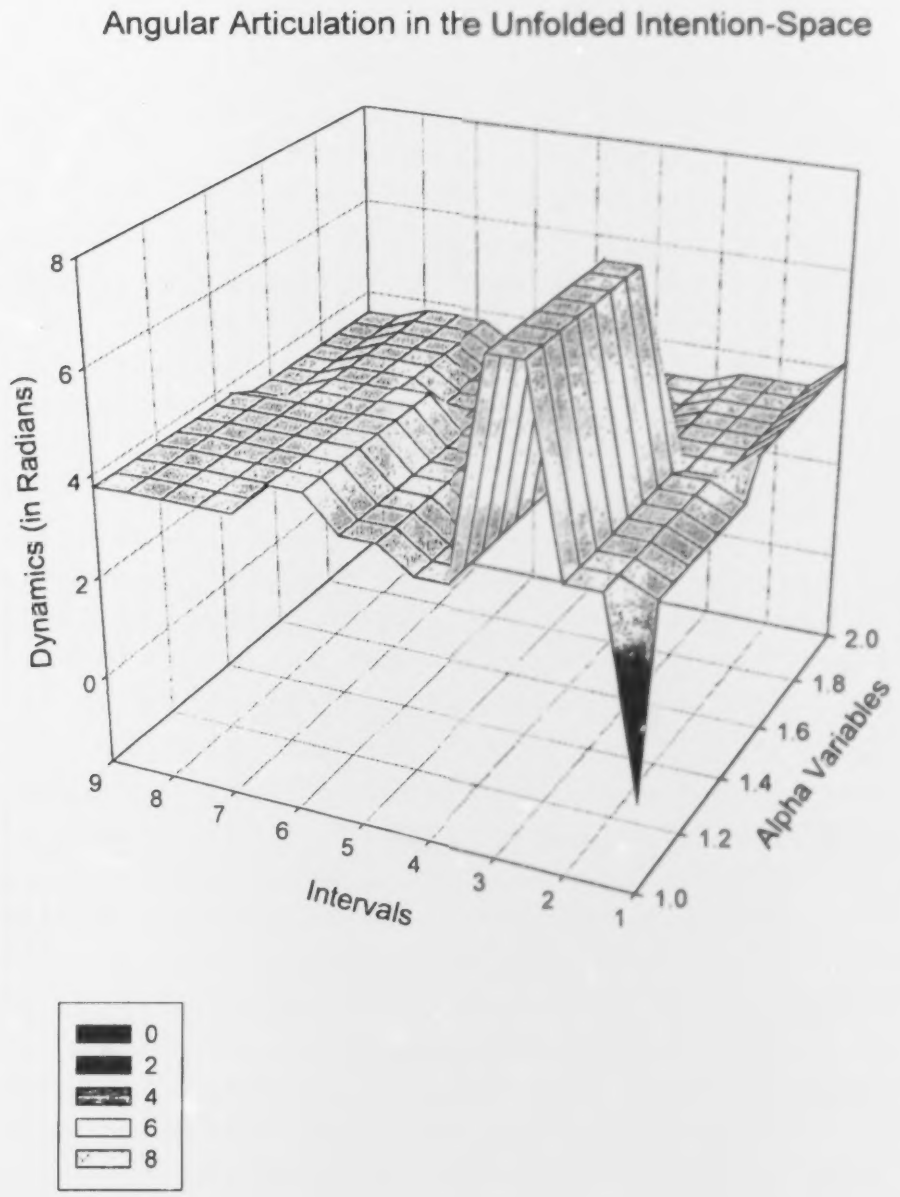


Figure 5.

Text B1: Synthetic – Reflective Approach to the Saga of Gunnlaug Ormstunga

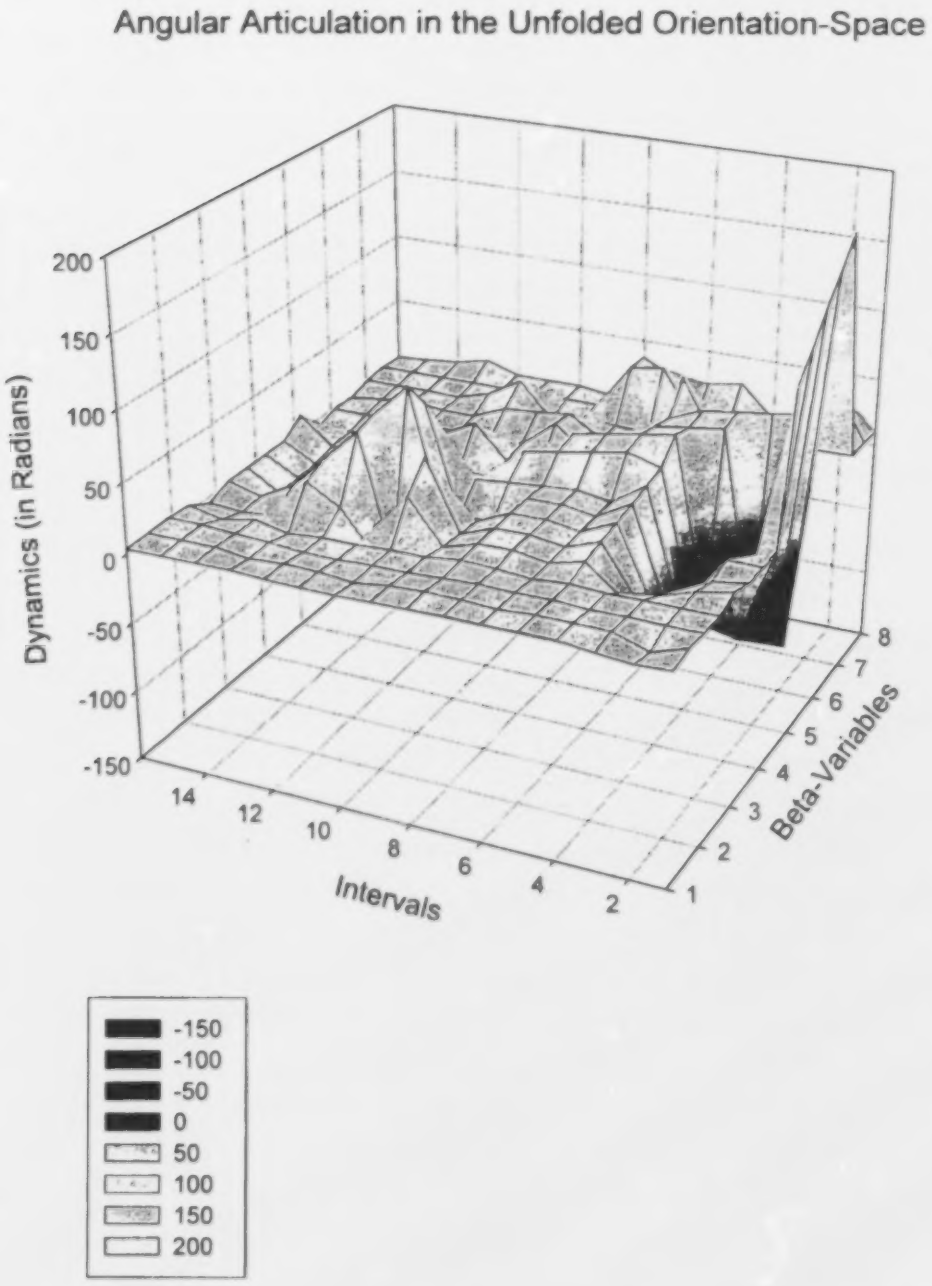
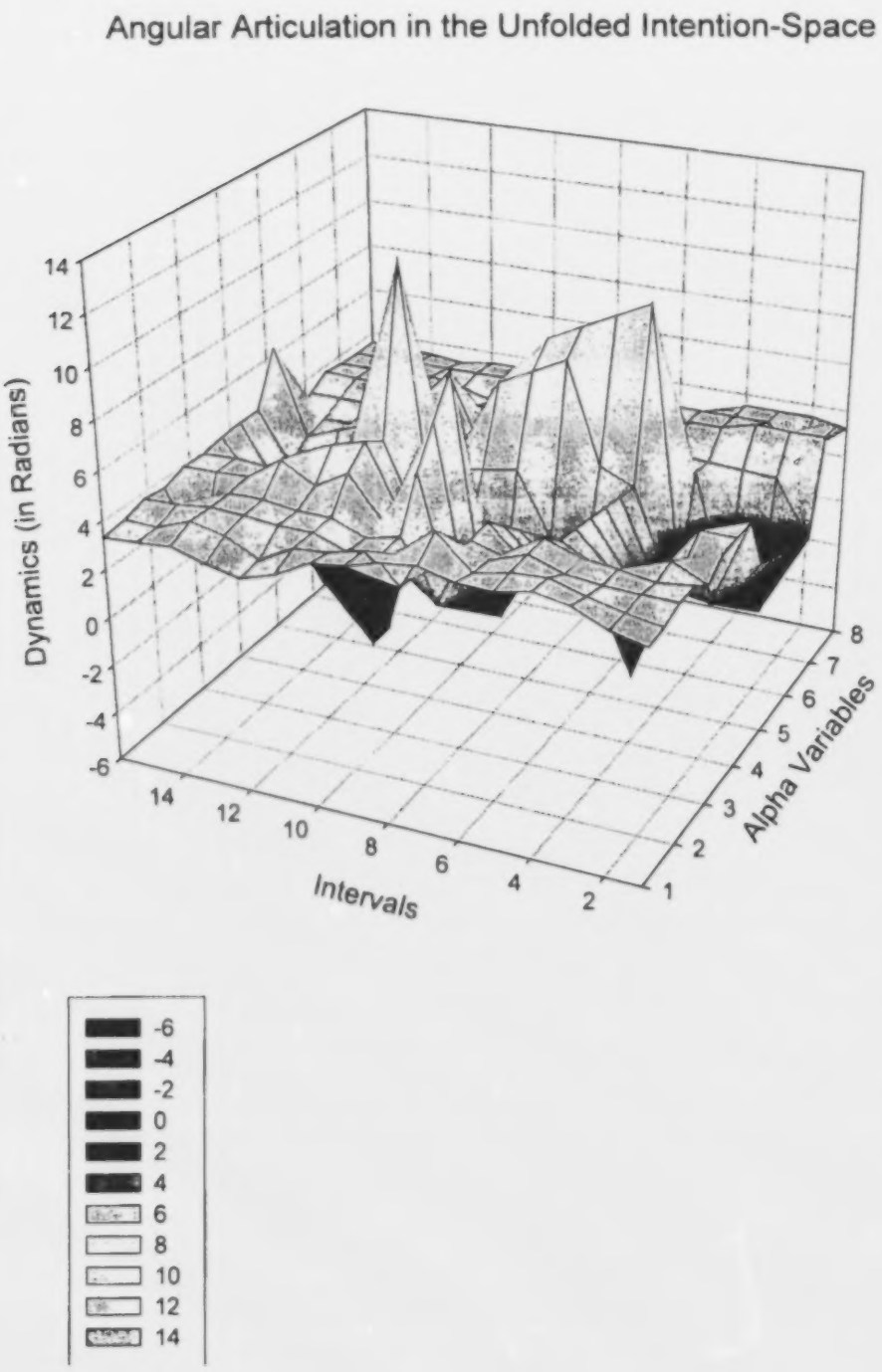


Figure 6.

Text B1: Synthetic – Reflective Approach to the Saga of Gunnlaug Ormstunga



In disciplining the convolution with the negative exponential function a squared pattern is placed on it, and a three-dimensional fitness landscape comes up.

In the first case (A), timing is demonstratively associated with the speed of changing α' and β's, as was manifested through the unfolded spaces of intention and orientation. Formally, the force in the attractor spaces of Text (A) and (B) is an expression of the stress in a sentence construction. This implies that the stress-function can be used in a fusion procedure to force measures of distance to generate the resonance properties of the Figures 7 to 10. The Figures are demonstrating the explicitness of the functional relation between the holophors of the emerging attractor spaces.

Parallel operating stress relations have established the X- and Y-axes of the patterns. In particular, the X-axis represents the straining effects, whereas the Y-axis accounts for the stretching effects. Meanwhile, the Z-axis denotes the aggregated acceleration in the rotations. Together, they show that each landscape has its specific layout in the form of mountains and valleys. For example, the fusion process, expressed through aggregation of the radians, depicts in Figure 7 the effect of swift changes, which is a measure on the degree of "directness". Stepwise increase or decrease in the agglomeration has developed a compressed landscape with a few rising mountains.

Now let us examine to what level the (A) reader has been sensible. Since this text is compact and inflexible in its layout, it represents only a faint deep-structure relation. The elastic properties of this particular text refer to the amount of displaced textual elements, whose essence has been visualised through the unfolded spaces of the previous section. Specific changes in their underlying pattern dynamics concern magnitude and direction, which have been recovered and extracted through the latticed patterning of the angular articulation. In manifesting the effects, expressed through the radians, the existence of distinct attractor spaces is made evident in the Figure 7 and 8. By localising the emerging thermodynamic state attractors in the latticed spaces, specification can be achieved on the basis of neighbouring attractors. If these attractors are regarded as an expression of distance or depth, then the emerging landscapes have empirical implications.

As a rule, it is always possible to associate a descriptor with fused textual segments. In this sense, a descriptor communicates the state that a system has been attracted to in the realisation of a particular action. The closeness of a particular descriptor name to some other descriptor names in space and time makes their fusion possible and transforms the entrenched point attractor into a structured configuration. Once a new terminus has come into existence, its transformation through successive states imposes rigour on the process of naming and generates informational specificity. Shared termini may emerge, but become specified through their "new" structural relationship. Through the causal relationship between termini and the underlying resonance structure, individual specificity makes evident that the particular text producer is contributing uniqueness in his way of grasping the centrality of a certain phenomenon, e.g. fate.

However, for assessing the meaning of the fusion process, it is essential to turn to the psychological import of the mountains and their peaks. The order of their composition is the result of the governing dependency relationship. The order, determining the direction in the orientation of (A), is marked at the foothills of the right hand side. The terminus communicates a concern with forces that may affect one's destiny or future. At the left hand side appears a terminus that makes clear that the forces or powers cannot be persuaded by a plea. Further, carrying out an act of courage in the presence of an inevitable course of events marks a sensibility to the unavoidable. The depth of the unenforceable appears in the state attractor below sea level.

Figure 7.

Text A1: Analytic – Descriptive Approach to the Saga of Gunnlaug Ormstunga

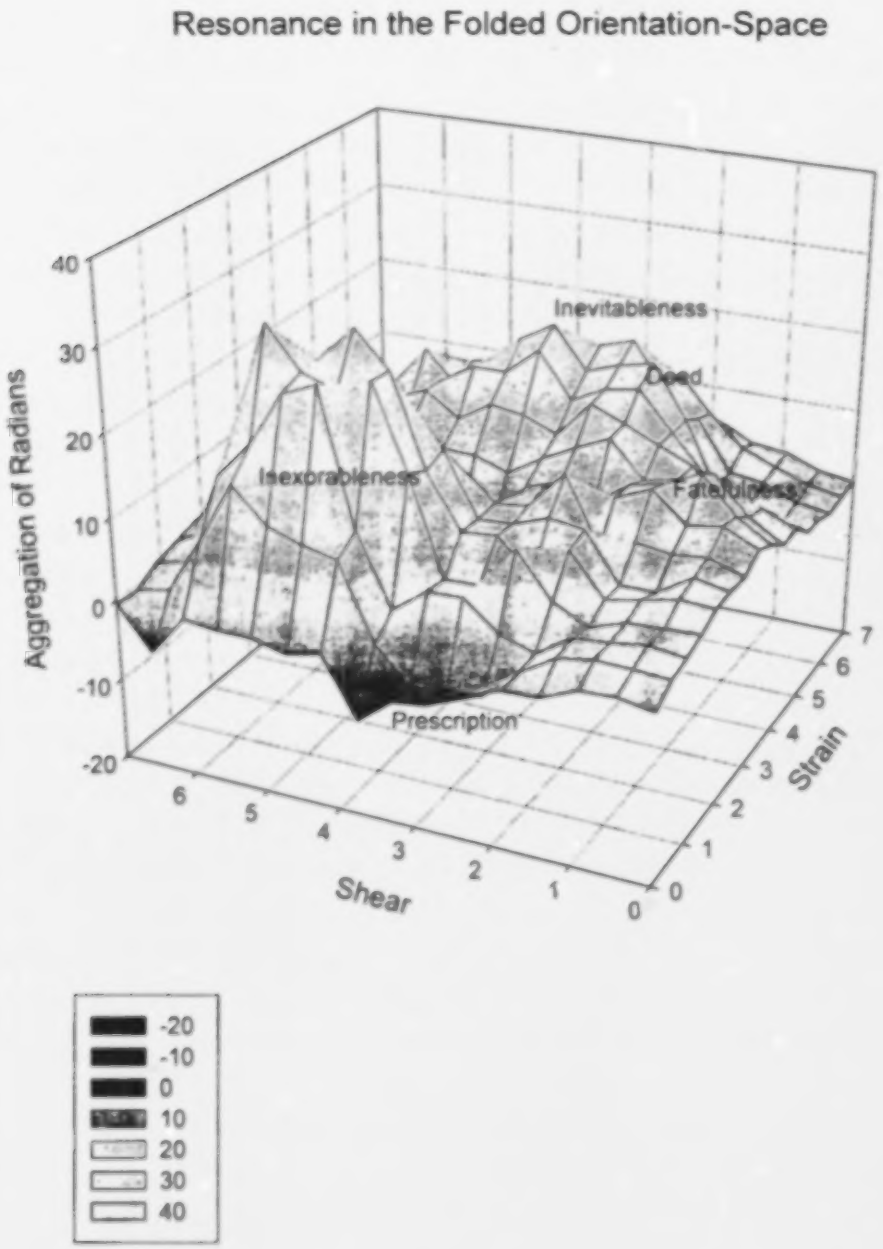


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Figure 8.

Text A1: Analytic – Descriptive Approach to the Saga of Gunnlaug Ormstunga

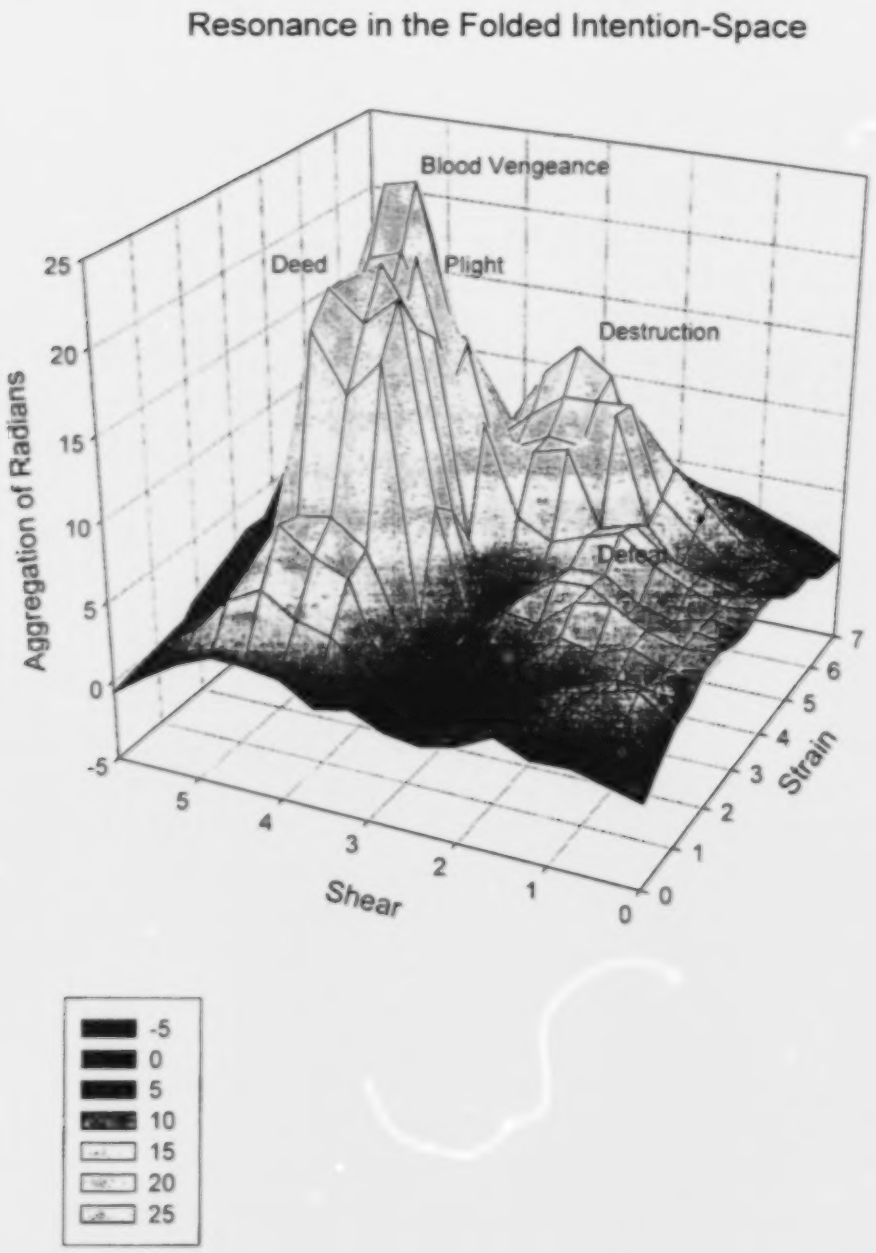

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Figure 9.

Text B1: Synthetic – Reflective Approach to the Saga of Gunnlaug Ormstunga

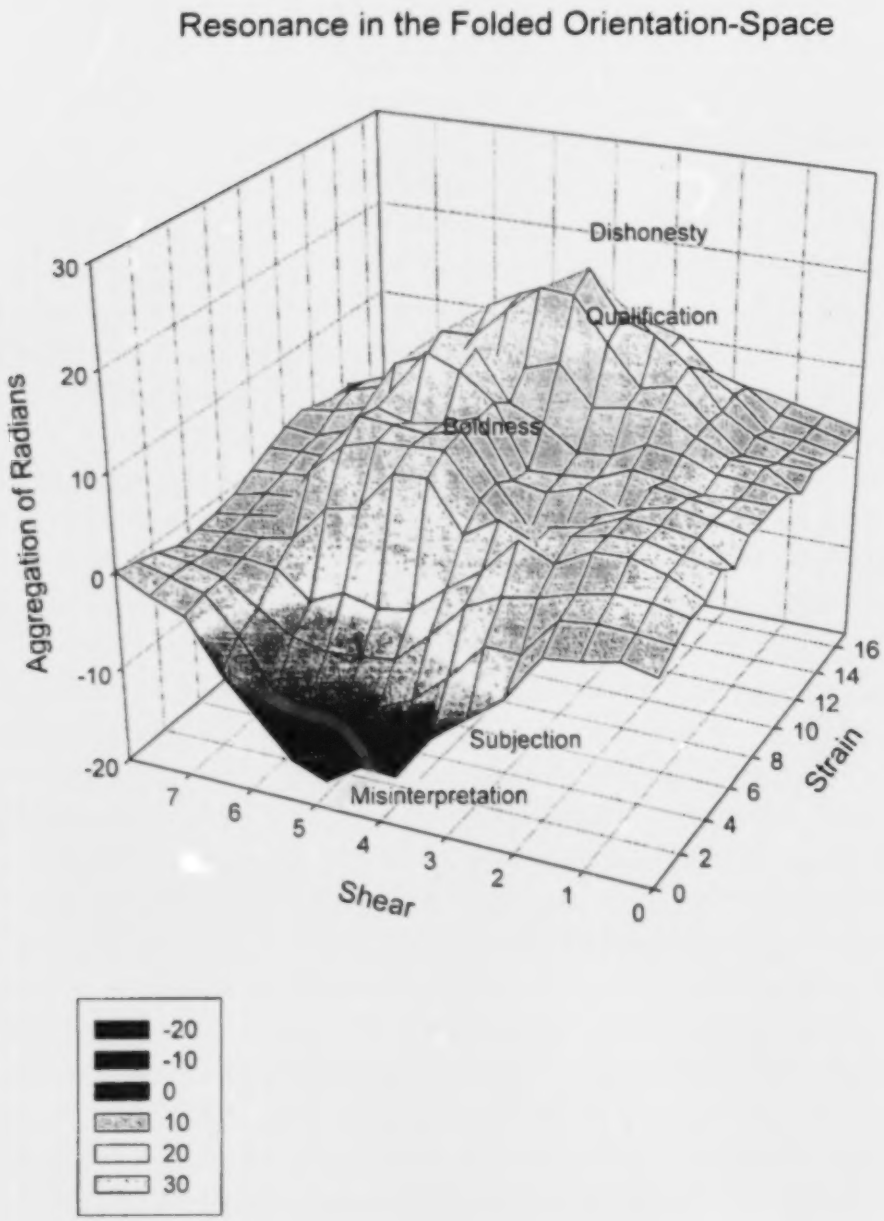

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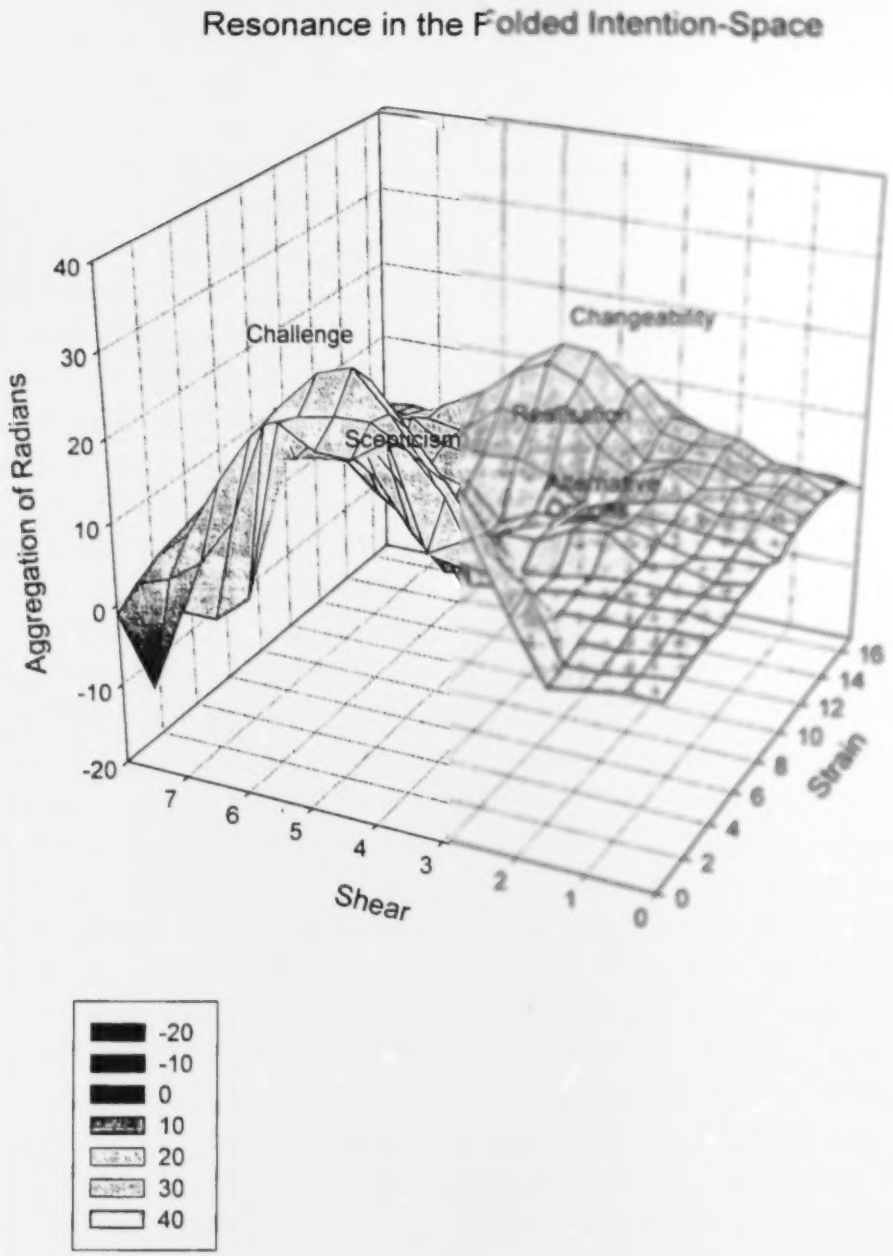
Figure 10.

Text B1: Synthetic – Reflective Approach to the Saga of Gunnlaug Ormstunga



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In studying the landscape of Figure 8, it becomes evident that componential asymmetry is captured through the extraction process. The foothills are marked through voiding a deed. In most general terms, this state attractor does not necessarily imply finality of outcome. However, the middle mountain range suggests a greater emphasis on subservience. The mountain peaks at the left hand side imply a particular preparedness for exhibiting an action, which physically fits the identified obligation. This group marks a most powerful concentration where honour and kinship are valued higher than individual life.

That the shapes of the unfolded spaces are related to the descriptive and reflective ability or strategy will be demonstrated with reference to the Figures 9 and 10. This time, the method has folded the spatial layout of the text to detect a landscape that is much softer in its contour lines. Most central appears the requirement of courage, which however refers to something that is very different with respect to the implications of the terminus in the context of Text (A). Hence, the centre of the present landscape is marked by a discerning sensibility. What is clear and distinct to the eye of the producer of Text (B) is the dividing line between seeking of protection and relying on illusory phenomena on one hand and the capacity to qualify and master misleading actions. This ability may be conceived of as a stratagem that has the task to draw attention away from defensive actions. Of course, this requires that one is keenly perceptive and discerning in his behavioural conduct.

In turning to the landscape of Figure 10, it becomes immediately clear that the folds reflect the condition of being able to exercise control over one's thought and actions. Two hills have appeared, one in the foreground and the other one in the background. Both characterise a capability of alteration. The call to engage in the contest and a demand for an explanation appears through the other state attractor in the background. Hence, challenging means in particular a calling into question, which evidently is characterising the intention to make the circumstances changing. The specific way of grasping the centrality of the studied saga is getting its particular significance through scepticism, which concerns the fact that the story is composed of two unlike parts. This circumstance is communicating a double meaning.

The realisation of alternative options concerns the style in which the meaning of the story is picked up and transformed into text building behaviour. Related to this particular discourse is the implicitness in the way in which chance and necessity are addressed. Hence, this landscape is describing a particular outlook, which is incorporated in the style of argumentation and concerns a discourse on the chances for success.

In conclusion, Text (A) is concerned with the external events and the objective and matter-of-fact based content. This text gives expression to a sensibility to surface features and consequently to the presence of an analytic-descriptive level. This sensibility to the textual context means sensibility to the inclinations of the characters to submit to external forces.

Text (B) is concerned with the reflective dimension. This text makes evident a different sensibility, which is concerned with actions that encourage one to change the patterns of life, i.e., not to let fate have its course. Thus seeking comfort and security through traditional modes of action has been questioned and contrasted with another line of reasoning. Since the saga is also realising responsibility for one's actions, the described configuration makes evident the significance of the implied line of scepticism. Having concentrated on the possibility of making the characters of the saga responsible for their own actions, the configuration of extracted intentionality brings out the possibility of change and a future without dominating external forces.

Discussion

In essence, three predictive frameworks of consciousness have been developed thus far. The first one is concerned with brain structures and functions (e.g. Edelman & Changeux, 2001; Davidson, 2002). Thus, the major approach in the study of consciousness, and consequently how competence may develop, is carried out in the fields of neurology. But it has a serious limitation, namely the lack of a morphological basis that can provide a sound foundation for an account in evolutionary terms of the processes at the cell level (Miklos, 2001). However, the interpretation of the discovered mechanisms on the basis of the gathered sets of data are connected with the difficulty to circumvent or explain away the problems posed by intentional interactions, non-linearity and emergent properties. Therefore, this line of approach has been trying to define consciousness either in terms of attention and awareness or in terms of the "self" (LeDoux, 2002). Furthermore, it has become obvious that consciousness and the development of competence can only emerge under the condition of novelty.

The other influential hypothesis concerning consciousness has been put forward in the form of a "mind-brain-interaction model" (Sperry, 1968). In essence this model appears to be a competence model, since it builds on two kinds of functions. The first relates to the familiarity of objects and events in information processing, the other locates this processing in the anterior commissure and bilateral functioning of the brain. Thus, since the property of novel is reflected as basis, Sperry suggests that the model can reflect the emergence of consciousness. However, since Sperry fails to give a satisfactory account for the necessary synthesising processes, the model has only the capacity to explain the generation of knowledge, i.e., facts. The underlying humanistic approach includes those aspects of behaviour that in the tradition of cognitive psychology are conceived of as properties of the mind. Therefore, he comes to the conclusion that "mental states", i.e. collectively addressed with "mind", are emergent properties of the brain. According to him, the emergent properties have to be regarded as produced by principles that control the interactions between "consciousness" (at the top of a hierarchy of events) and processes concerning the synaptic substrates in the brain. The latter are seen to substantiate consciousness. Hence the model is faced with a large explanatory gap between the processes of the brain and the processes of the mind, which the former have produced.

Jaynes (1982) has put forward the third hypothesis, that is, consciousness must be conceived of as a deontological phenomenon. Therefore, the hypothesis reflects the fact that Jaynes argues for the existence of "subjective consciousness". Accordingly, he proposes that consciousness is a subjective state and that only exhaustive historical accounts can provide the basis for its substantiation, e.g. in moral prescriptions and judgement. In conclusion, the emergence of consciousness is unique in each subject, but may have some common properties, which are observable in public.

In contrast to these approaches, the context of the presented experiment provides for an alternative explanation of consciousness and the development of competence. In essence, the experiment shows that the study of consciousness should be based on something more than the mechanisms of biochemical change in the strength of neural connections or on historical records. In fact, the AaO-principle, which is the foundation for linking the patterns of verbal activity, has been shown to produce a dynamics and a structure that goes far beyond the knowledge that can be made available through phenomenological considerations and semantic interpretations. Since the AaO-principle provides a framework for the establishment of the thermodynamic laws that govern the production of a discourse from which consciousness can be extracted, the study of consciousness should be related to text building behaviour.

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